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S P E C I F I C A T I O N

OF

JOHN ANDREWS.

COKE OVENS.

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Coke Ovens.

ANDREWS' SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JOHN ANDREWS, of Fair Oak Terrace, Mainde, near Newport, Monmouthshire, Contractor, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by
5 Her Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Sixth day of July, One thousand eight hundred and fifty-two, in the sixteenth year of Her reign, did give and grant unto me, the said John Andrews, my exors, admors, and assigns, Her especial licence, full power, sole privilege and
10 authority, that I, the said John Andrews, my exors, admors, and assigns, or such others as I, the said John Andrews, my exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter, during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales,
15 and the Town of Berwick-upon-Tweed, my Invention of "CERTAIN IMPROVEMENTS IN COKE OVENS, AND IN THE APPARATUS CONNECTED THEREWITH;" in which said Letters Patent there is contained a proviso requiring that I, the said John Andrews, should particularly describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, by
20 an instrument in writing under my hand and seal, and cause the same to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

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NOW KNOW YE, that in compliance with the said proviso, I, the said John Andrews, do hereby declare that the nature of my Invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by this present Instrument in writing, reference being had to the Drawings hereunto annexed, that is to say:—

5

My Invention consists,—

Firstly, in a peculiar mode of constructing ovens for converting coal into coke, commonly called coke ovens. And,

Secondly, in the apparatus and mode of discharging the oven after the coking process has been completed.

10

And in order that the same may be readily understood and carried into effect, I will proceed to describe the Drawings hereunto annexed, in which similar letters denote corresponding parts in all the Figures, that is to say:—

DESCRIPTION OF THE DRAWINGS.

Figure 1., Sheet I., represents a front view of three double ovens, or six 15 ovens built back to back, and represented in Figure 1 as being part in section and part in elevation. Figure 2 represents a sectional plan of the six ovens, that is, the three in front A, which I shall designate the front ovens, and the three marked B, which I shall call the back ovens, which it will be seen hereafter are somewhat differently constructed, although the principle of 20 working and action is the same. Figure 3 represents a longitudinal vertical section of the double ovens, taken through the pier or buttress on the line 1, 1, of Figures 1 and 2. Figure 4 represents a longitudinal sectional elevation taken through the centre of the ovens on the line 2¹, 2¹, of Figure 1.

The principal features in the construction of the ovens about to be described 25 under the first head of my improvements consist, firstly, in the arrangement of the flues for the escape of gases and other products of combustion; and, secondly, the mode of supplying the ovens with the requisite quantity of atmospheric air for supporting combustion. And in order that the same may be understood, I will first describe the construction of the front set of ovens 30 marked with the letter A.

On referring to A, Figure 3, which it will be remembered is a section through the pier or wall which separates the ovens, there is an opening *a* proceeding from the front of the oven, through which the gases and other products of combustion from the oven pass into the flue *b*, and from thence 35 into the chimney, which is divided by a partition wall *c* so as to answer for both, that is, the front and back ovens A and B. *d* is a sliding damper, by closing which the direction or course of the flame and hot air, instead of

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passing through the flue *b*, as just described, take the downward course through the vertical flue *e* which communicates with the horizontal flues *f*, *f*, through which flues the hot air passes in the direction indicated by the arrows, as shewn in Plan A, Figure 2, which portion of the plan is a section taken
 5 through the line 3 of Figure 3, with this addition, that the floor of the oven is represented as being removed, in order to shew more clearly the direction of the flues *f*, *f*, which it will be observed, on referring to Figures 1 and 2, pass underneath the floor of the oven on each side of the pier, and terminate, or rather unite again at the point *g*, see Figures 2 and 3, where they, the
 10 gases, proceed along the flue *g*¹ and into the chimney, as indicated by the arrow, see Figure 3. It will therefore be seen that the products of combustion can either be passed from the oven direct through the flue *b* into the chimney, or by closing the damper *d* they can be passed underneath the floor of the oven before entering the chimney. The object of this arrangement is
 15 to effect a more perfect combustion of the coal which is undergoing the process of coking; and this object I accomplish by first allowing the gases to pass through the flue *b* direct to the chimney until about four hours more or less before the charge is withdrawn, when the damper *d* is closed, and the flame and hot air allowed to pass underneath the oven, in the manner just
 20 described, whereby a more perfect combustion of the coal in contact with the floor of the oven is effected, a better yield of coke produced, and the quality of coke will be improved, inasmuch as it will be found to be brighter and stronger than coke produced from ovens of the ordinary construction.

I will now briefly describe the construction of the back ovens marked B,
 25 in which it will be seen that the gases and other products of combustion pass through an opening *a*¹ at the back part of the oven into the flue *b*¹ and *b*² into the chimney; but on closing the damper *d*², the hot air and gases pass into the horizontal flue *f*¹ and along the flues *f*², *f*², *f*³, *f*³ (see Figure 2, B, Section 3), and into the flue *f*⁴, shewn in dotted lines, and from thence through
 30 the vertical flue *f*⁵ (see Figure 3) into the chimney.

The manner in which I propose to supply the ovens with atmospheric air during the process of coking is as follows, that is to say:—When the charge is first put into the oven I prefer to introduce therein a supply of cold air, which passes through three apertures *i*, *i*, made over the crown of the front
 35 arch or “blocking,” and which apertures enter the oven just below the crown of the arch forming the top of the oven, as will be seen on referring to Figures 1 and 4. After the coking process has been going on for about twelve hours, more or less, I prefer to work the oven with a supply of hot air, or, in other words, to heat the atmospheric air before it enters the oven. For

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this purpose the front of the three air holes *i, i*, are stopped up, and the two air holes on each side, marked *k, k*, which were previously closed, are opened. The air for the supply of combustion must therefore pass through channels *k, k, l, l*, formed on the top of the brick arch of the oven, and which channels communicate, as will be seen on referring to Figures 1 and 2, with 5 the three apertures for the supply of cold air, by closing which, however, the air becomes heated before entering the oven. This mode of supplying the oven with hot air has also a tendency to improve the quality of the coke as well as the yield.

I would remark, with regard to this part of my Invention, that I do not 10 claim as new the mode of introducing cold air just below the crown of the arch of the oven by the three apertures *i, i*, when considered separately; but what I do claim as being new is, the combining of such apertures with channels formed on the top of the arch, or other suitable part of the oven, for heating the air previous to introducing it into the oven, as herein-before 15 described.

Figures 5, 6, 7, 8, 9, and 10 represent six views of the form of oven I construct when the cost of construction is limited, and they are required at a cheap rate. Figure 5 is a back elevation of two ovens; Figure 6, a transverse section taken through the line 4, 4, of Figure 7, which Figure is a 20 longitudinal section taken through the centre of the oven; Figure 8 is a plan of the two ovens; Figure 9 is a sectional plan; and Figure 10, a longitudinal sectional elevation taken through the pier on the line 6, 6, of Figure 9. This form of oven is constructed with eighteen-inch piers tapering to fourteen inches, and with nine-inch backs to the ovens. The flame and gases escape 25 through a lateral opening *p* at the back or further end of the oven into the chimney which is common to both ovens. The manner in which I propose to remove the coke from the oven is in some cases by making a portion of the back of the oven moveable, so as to answer the purpose of a draw plate, which portion of the back of such oven or ovens may be pushed out, and with it the coke, 30 as will be hereafter described. At the back of the ovens, Figures 5, 6, and 7, there is an opening made somewhat narrower than the width of the oven, and about fifteen inches high, more or less. Into this opening there is placed a cast-iron box or frame *r*, which is filled with fire brick or other suitable material. The box or frame *r*, which, it will be observed, forms part and parcel 35 of the back of the oven, having been inserted in the opening, is luted all round, so as to prevent the admission of atmospheric air during the process of coking. When it is desired to remove the coke from the oven, a strong wrought-iron bar *m* is introduced between two guide rollers supported by a

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frame at the back of the oven, and into a socket cast on the back part of the box, see Figure 7. To the end of the bar *m* there is attached a chain which passes under the guide roller *o*, and is attached at the opposite end to a crab, by turning the handle of which the bar and loose back *r* will be forced forward, and the coke removed from the oven. By this arrangement the wrought-iron bar will not be liable to become overheated, and the general arrangement will be found useful in cases where it is not convenient to have the drawing apparatus in front of the oven.

I will now describe two other forms of oven which may be constructed at a cheap cost, and afterwards I will describe my improved apparatus for drawing the coke out of the ovens, reference being had to Sheet II. on which Sheet Figure 11 represents a sectional elevation of an oven with fourteen-inch piers tapering to nine inches in front, and with one chimney to each oven, the opening to the chimney being in the centre of the back, as will be seen at Figure 12, which represents a sectional plan of Figure 11.

Figure 14 is a sectional plan, and Figure 15 a sectional elevation taken through the pier of an oven, with an opening at the back which communicates with a flue running along the top of the pier to the chimney, which in this case is built in front of the oven. I would remark, with regard to the ovens described under Figures 5 to 15, that they may be used with advantage with a quick-burning coal; but when the coal is slow and dead-burning, I prefer to use the form of oven described under the Figures 1 to 4. I would also remark, that in localities where stonework can be had at a cheaper rate than brickwork that I prefer to use that material for the foundations and other parts marked with the letter *x* in the several Figures from 1 to 16 inclusively.

Having thus described the construction and action of my improved coke ovens, I will now proceed to describe my improvements in the apparatus for withdrawing the coke from the oven after the coking process has been completed.

Figure 16 represents a plan, and Figure 17 an edge view of a drawplate and bar, which I propose to construct as follows:—*r*¹ is a piece cut off the end of a flat bar of iron about two and a half inches thick, and twelve inches wide, more or less, or, what will answer the same purpose, a piece cut off the end of a railway bar. On the back of this there is a strong cast-iron plate *s*. *t* is the draw bar, which may be of two inch or two-and-a-half inch round iron, one end of which is turned round so as to form an eye, and the other is passed through the plates *r* and *s*, which are firmly secured thereto by a cotter on the back side of the plate *s*. *v* is a recess formed in the back part of the oven (see Figure 4) for receiving the drawplate, which drawplate, together with the bar, is placed in the oven previous to charging the same with coal, and remains

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in the oven during the whole time the coal is undergoing the process of coking. The manner in which I protect the draw bar *t* from being overheated during the process of coking is as follows, that is to say:—I prepare a kind of trough by bending a piece of sheet iron in a semicircular form, and in length equal to that of the length of the oven, as shewn at *w*, Figure 2 (Sheet I.). Previous to charging the oven with coal, the trough *w* is laid with its concave side upwards, and filled with fine ashes, dust, or other bad conductor of heat, and in this position the trough is slid into the oven alongside or parallel to the draw bar *t*. The trough having been forced into the position shewn at *w*, Figure 2, is then turned over upon the draw bar, with its convex side upwards, as shewn at *w*¹ (see Figures 1 and 2). The draw bar will now be surrounded with the loose material with which the trough was filled. I then re-commence charging the oven in the usual way. After the operation of charging the trough, which has during the charging answered the purpose of a “centre” for the formation of an arch of coal, may now be withdrawn, the sliding door of the oven let down and “luted,” and the coking process commenced. It will therefore be seen that, in place of introducing tubes or covered ways in the floor and side walls, as mentioned in the eighth claim of a Patent granted to Henry Fisher, on the Eighth day of February, One thousand eight hundred and forty-nine, I form an archway of the coal which is about to be converted into coke, thereby avoiding the necessity of introducing materials into the oven for the formation of a covered way, which must necessarily be attended with expence. The coke is withdrawn from the ovens by means of a crab *y* (see Sheet II.), with a chain passing round the pullies *z, z, z*, firmly fixed opposite the centre of each oven, as is well understood, and to which, as well as the sliding door for closing the front of the oven, I lay no claim, they having been used by me prior to the date of my Patent.

Having thus described the nature of my Invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to the precise details herein-before described, so long as the peculiar character of my Invention be retained, neither do I confine myself to the materials or dimensions of the parts herein-before described, as the same may be greatly varied without departing from the principal features of my said Invention; but that which I do claim is, the general arrangement and combination of parts as herein-before described in the construction of coke ovens, and in the apparatus for or mode of discharging the same.

In witness whereof, I, the said John Andrews, have hereunto set my hand and seal, this Thirty-first day of December, in the year of our Lord One thousand eight hundred and fifty-two.

JOHN (L.S.) ANDREWS. 40

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AND BE IT REMEMBERED, that on the Thirty-first day of December, in the year of our Lord 1852, the aforesaid John Andrews came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form 5 above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

LLEWELLIN, Extra.

Enrolled the Sixth day of January, in the year of our Lord One thousand eight hundred and fifty-three.

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.

FIG. 1.

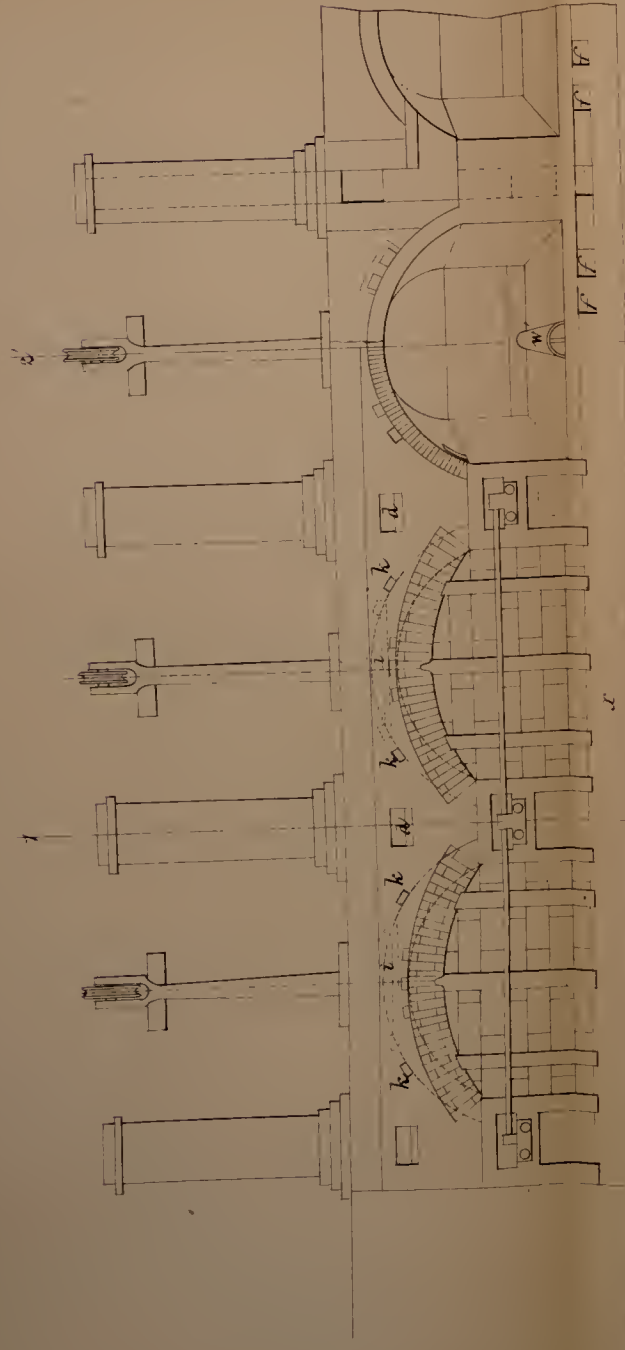


FIG. 3.

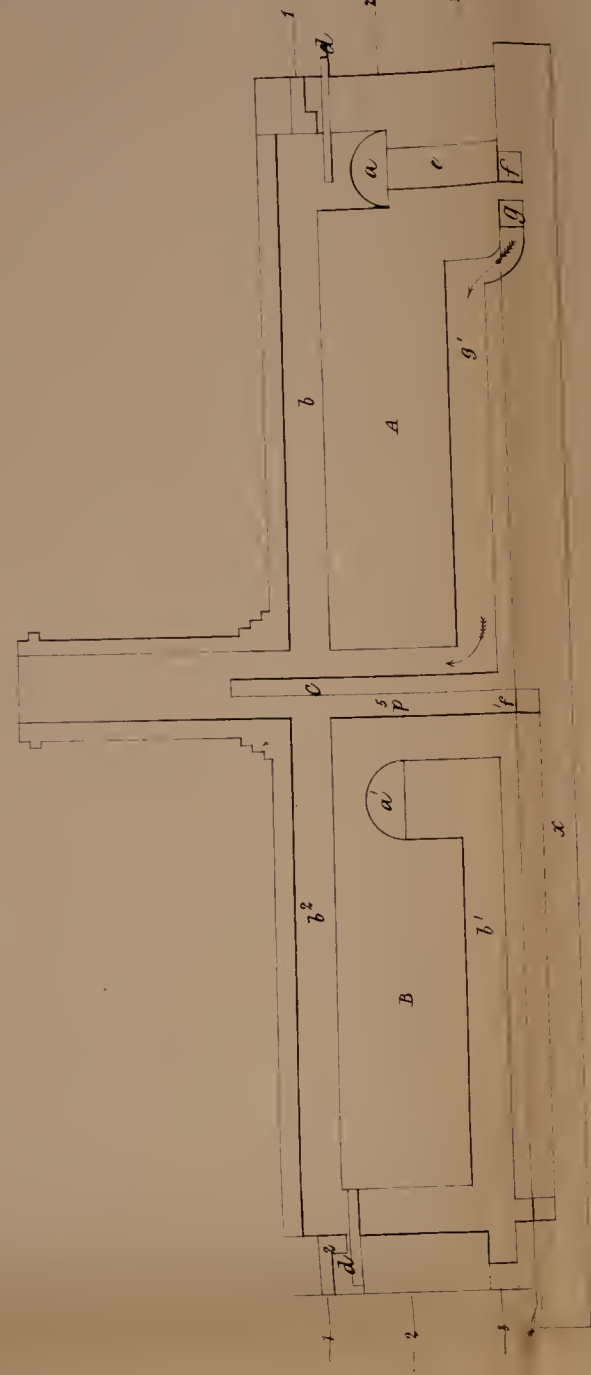


FIG. 2.

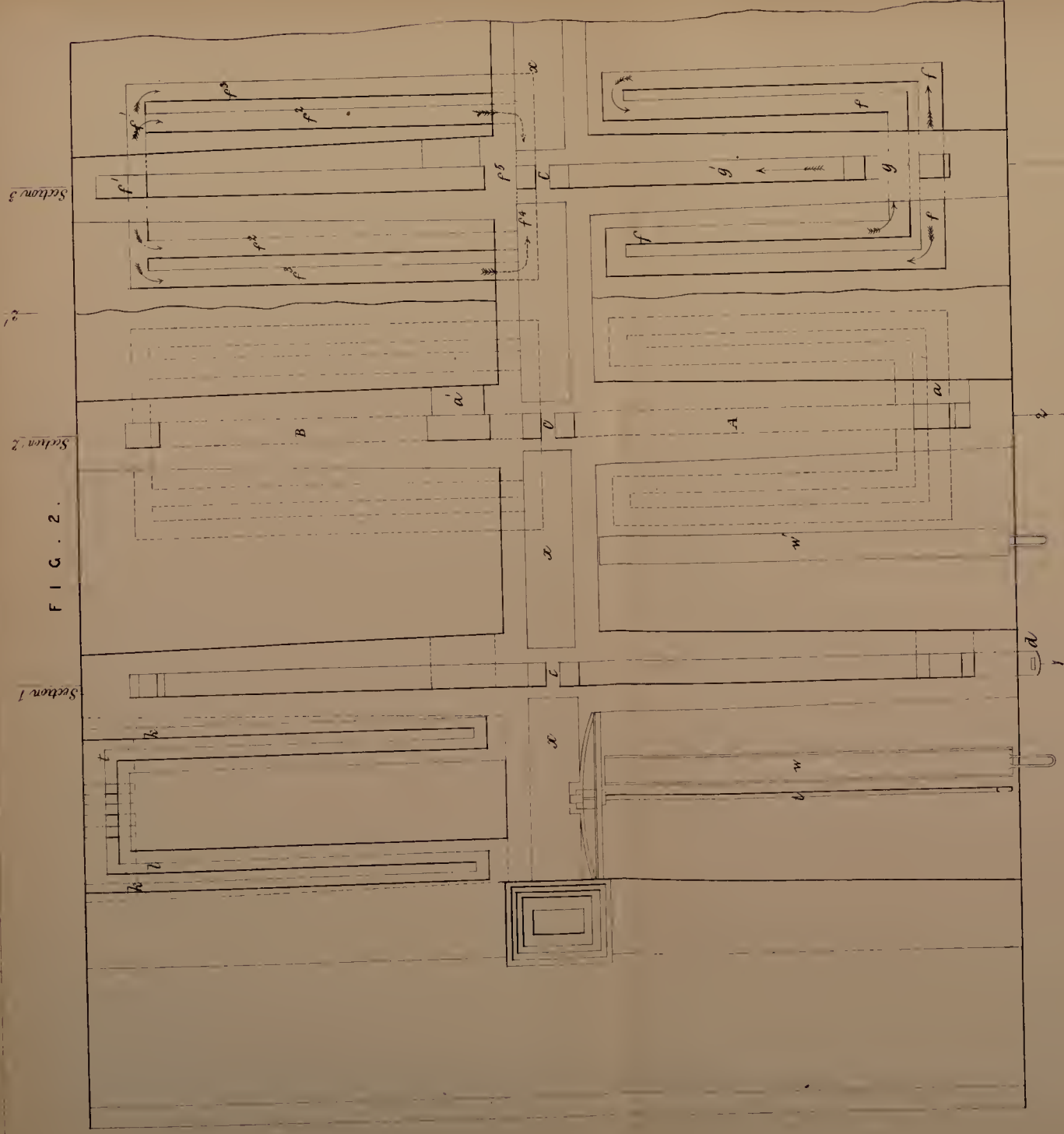


FIG. 4.

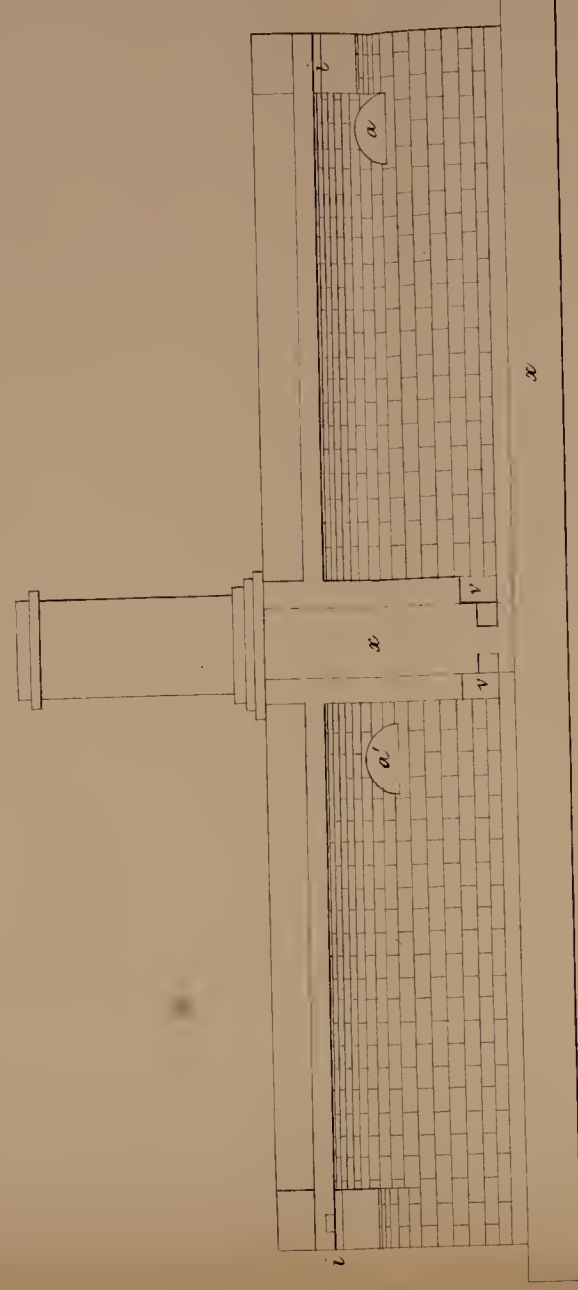


FIG. 5.

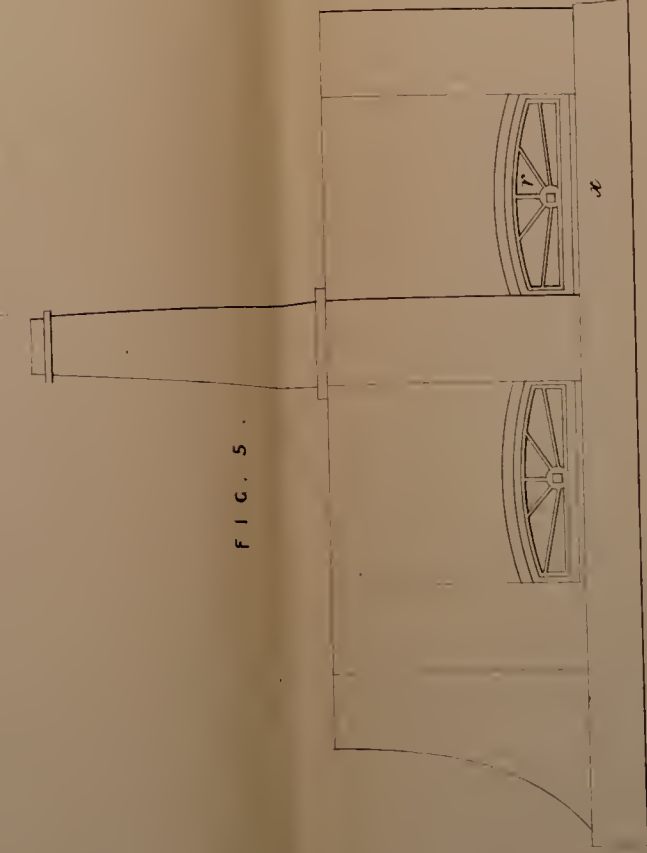


FIG. 6.

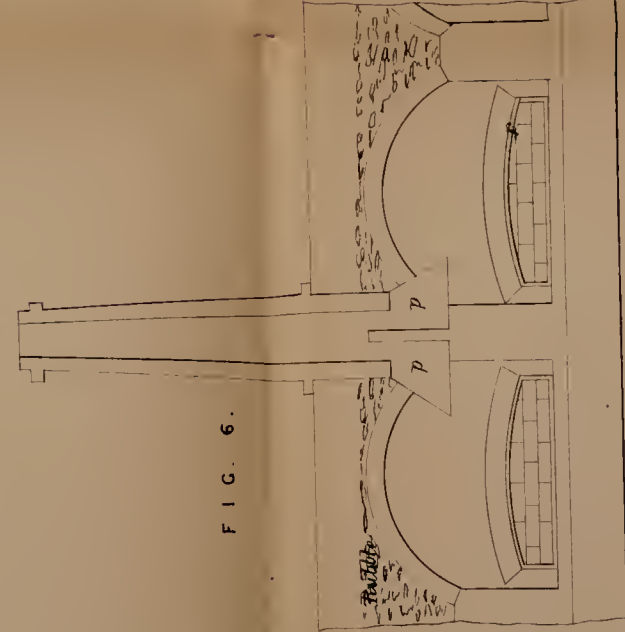


FIG. 8.

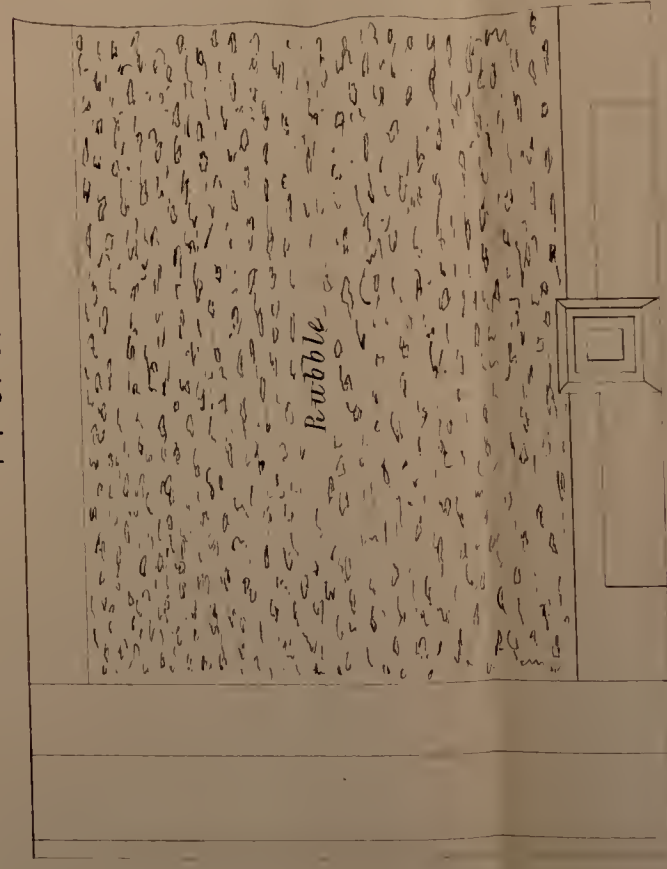


FIG. 9.

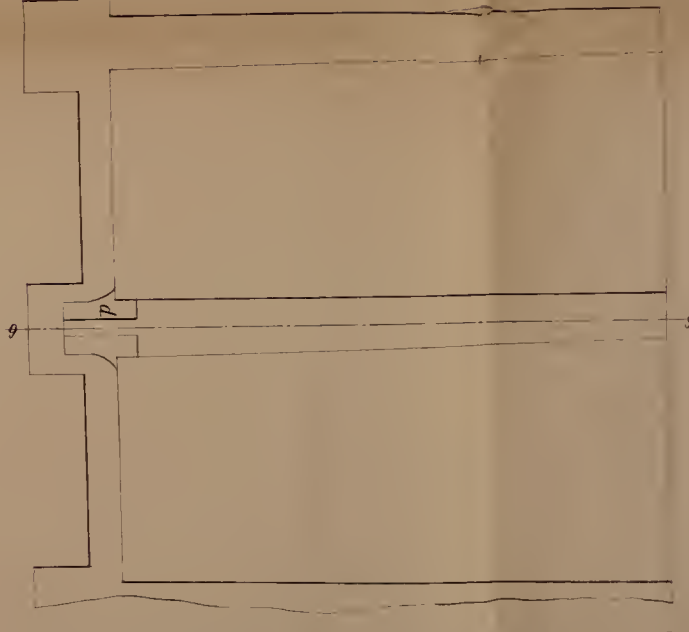


FIG. 10.

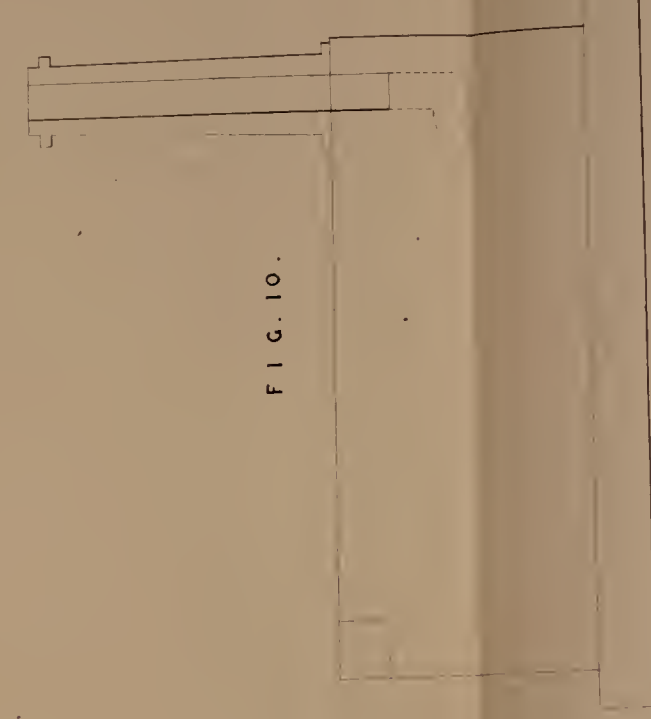


FIG. 7.

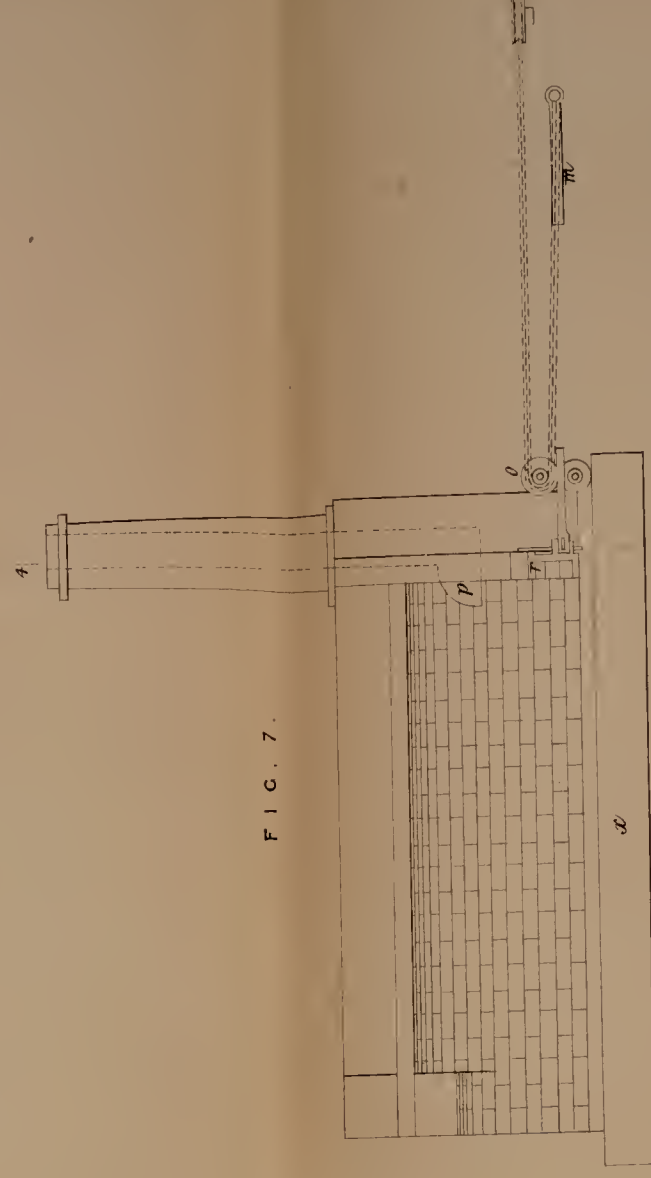


FIG. 11.

FIG. 12.

FIG. 14.

FIG. 16.

FIG. 17.

FIG. 15.

The enrolled drawing is colored

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